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EXAMINER

VANORE, DAVID A

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* VICTOR M. BENVENISTE

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Appeal 2009-2197  
Application 10/669,186  
Technology Center 2800

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Decided:<sup>1</sup> April 2, 2009

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Before KENNETH W. HAIRSTON, JOHN A. JEFFERY, and BRADLEY  
W. BAUMEISTER, *Administrative Patent Judges*.

BAUMEISTER, *Administrative Patent Judge*.

DECISION ON APPEAL

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

## STATEMENT OF CASE

Appellant appeals under 35 U.S.C. § 134 (2002) from the Examiner's rejection of claims 1-17 and 21-29.<sup>2</sup> We have jurisdiction under 35 U.S.C. § 6(b) (2002). We affirm.

### A. *Appellant's invention*

Appellant's invention relates to a mass analyzer comprised of two permanent magnets—but no electromagnets—that generates a substantially uniform magnetic field but not an electric field. (App. Br. 2).

### B. *The claims*

Independent claim 1 is illustrative.<sup>3</sup> It reads as follows:

1. A ribbon beam ion implantation system comprising:  
  
an ion source operable to generate multiple ion species from a source material;  
  
an extraction system configured to extract the ion species from the ion source and generate a ribbon-shaped ion beam; and

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<sup>2</sup> Although Appellant indicates that the rejection of claims 1, 21, and 29 is appealed (App. Br. 2; Reply Br. 2), and the Examiner likewise reproduces only the rejection of those claims in the Answer (Ans. 3-5), Appellant nonetheless argues the patentability of the pending dependent claims. *See* App. Br. 6 (“The other claims remaining in this case depend from claims 1, 21, or 29 and thus are also non-obvious over the cited art.”). Accordingly, all rejected claims are before us.

<sup>3</sup> Appellant argues claims 1, 2, 4-17, and 21-29 together as a group. *See* App. Br. 2-6. Accordingly, we select independent claim 1 as representative of these claims.

a mass analyzer comprised of a first permanent magnet and a second permanent magnet and without electromagnets that generates a substantially uniform magnetic field but not an electric field across a beam path of the ribbon-shaped ion beam to select a species from the multiple species initially present in the ribbon-shaped ion beam.

*C. The references and rejections*

The Examiner relies on the following prior art references to show unpatentability:<sup>4</sup>

Davis	US 3,711,706	Jan. 16, 1973
Vahrenkamp	US 4,315,153	Feb. 9, 1982
Benveniste	US 5,554,857	Sept. 10, 1996
Horsky	US 2004/0104682 A1 (PCT Filing Date June 12, 2001)	June 3, 2004

1. Claims 1, 2, 4-17, 21-29 stand rejected under 35 U.S.C. § 103(a) as obvious over Benveniste in view of Davis and Vahrenkamp.
2. Claim 3 stands rejected under 35 U.S.C. § 103(a) as obvious over Benveniste in view of Davis, Vahrenkamp, and Horsky.

Rather than repeat the arguments of the Appellant or the Examiner, we refer to the Briefs and the Answer for their respective details.<sup>5</sup> In this decision, we have considered only those arguments actually made by

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<sup>4</sup> See Final Office Action mailed June 20, 2007.

<sup>5</sup> We refer to (1) the Appeal Brief filed Jan. 4, 2008; (2) the Examiner's Answer mailed Apr. 22, 2008; and (3) the Reply Brief filed June 19, 2008, throughout this opinion.

Appellant. Arguments which Appellant could have made but did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

## ISSUE

The Examiner asserts that Benveniste discloses a ribbon ion beam implantation system comprising an ion source, an extraction system, and electromagnets—not permanent magnets; Davis teaches permanent magnets to separate charged particles without creating an electric field in a beam path; and Vahrenkamp provides motivation to substitute Davis’s permanent magnets for Benveniste’s electromagnets: (1) to produce a constant magnetic field without causing undesired pole piece heating as in an electromagnet, and (2) to reduce the cost associated with separating charged particles (Ans. 3-5).

Appellant asserts that:

- (1) Benveniste and Davis both teach away from using permanent magnets because Benveniste does not disclose permanent magnets and Davis discloses a preference for non-permanent electromagnets (Reply Br. 2);
- (2) Davis teaches away from Benveniste because modifying Benveniste to merely comprise the permanent magnets of Davis would render Benveniste unsuitable for its intended purpose of providing magnets with the flexibility of allowing tuning adjustment (App. Br. 3-4);
- (3) Vahrenkamp does not provide the requisite motivation to modify Benveniste because Vahrenkamp’s primary functionality is not employed in Benveniste. More specifically, Benveniste employs coils that vary the

current to alter a magnetic field strength to vary the tuning of the mass analyzer, while Vahrenkamp varies the electric field in an electric cross magnetic field ( $E \times B$ ) mass separator for tuning purposes to select a desired mass species (App. Br. 5);

(4) one of ordinary skill in the art may have been motivated to modify Benveniste in view of Vahrenkamp by adding potential plates to incorporate a variable electric field for further tuning flexibility, but such a modification would not render obvious a mass analyzer that generates a uniform magnetic field (App. Br. 5); and

(5) the Examiner's position—that an electromagnet (e.g., that of Benveniste) can be turned off in an attempt to equate the resulting steady state performance of the electromagnet to a constant magnetic field produced by a permanent magnet—is flawed because the deactivated electromagnet would no longer adjust the content of an ion beam, effectively rendering the ion implantation system useless for its intended purpose (Reply Br. 3).

The issue before us, then, is whether Appellant has shown that the Examiner erred in finding that the cited prior art collectively teaches or suggests to employ permanent magnets within the mass analyzer of a ribbon beam ion implantation system.

### FINDINGS OF FACT

The record supports the following Findings of Fact (FF) by a preponderance of the evidence:

1. Claim 1 does not require that mass analyzer of the claimed ribbon beam ion implantation system have adjustable-focus magnets.
2. Claim 1 does not limit the ion implantation system to any specific ion-beam current or energy ranges.
3. In addition to the inventive, adjustable-focus implantation system, Benveniste also discloses prior-art implantation systems that do not have adjustable-focus magnets (Benveniste, col. 1, l. 14 – col. 2, l. 15).
4. Benveniste discloses:

A ‘correct’ quadrupole magnetic field strength depends in part, on . . . parameters such as beam current, energy, mass, as well as beamline parameters such as residual gas composition and pressure. Existing high current implanters must operate with a wide range of parameters, ideally requiring different amounts of focussing [sic] for optimal transmission of the ion beam and optimal mass selectivity.

Current sector magnets found in ion implanters are designed with fixed quadrupole focussing [sic] strength, selected for best operation with a nominal set of beam parameters. Outside these nominal conditions, particularly at very low energy (less than 10 k volts) and high currents, the performance of these systems is significantly compromised.

(Benveniste, col. 2, ll. 1-15).

5. Benveniste is silent as to what types of magnets are used in these prior-art, fixed-magnetic-strength ion implantation systems. That is, Benveniste does not disclose whether permanent magnets or non-adjustable electromagnets are employed.
6. Davis teaches that either permanent magnets or electromagnets may be used for mass analyzers (Davis, col. 2, ll. 34-37).

7. Vahrenkamp discloses that permanent magnets have an advantage over electromagnets with respect to the implantation system's cost and complexity (Vahrenkamp, col. 3, ll. 36-37).
8. Davis does not state or imply that mass analyzers cannot be constructed with permanent magnets.
9. Davis expressly states that while electromagnets might be more preferable, permanent magnets may also be used (Davis, col. 2, ll. 34-37).

#### PRINCIPLES OF LAW

1. Appellant has the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).
2. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference . . . . Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). *See also In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983) (noting that "it is not necessary that the inventions of the references be physically combinable to render obvious the invention under review"); *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973) ("Combining the *teachings* of references does not involve an ability to



combine their specific structures.”). Rather, “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1740 (2007).

### ANALYSIS

Most of Appellant’s arguments are essentially directed towards the proposition that no motivation exists to substitute permanent magnets for the tunable electromagnets employed within the adjustable-focus mass analyzer of Benveniste’s inventive ribbon beam ion implantation system. Whether Appellant’s proposition is correct, though, is not dispositive of the present appeal. Appellant’s arguments frame the issue too narrowly.

Claim 1 does not require that the mass analyzer of the claimed ribbon beam ion implantation system have adjustable-focus magnets (FF 1). Nor does Claim 1 limit the ion implantation system to any specific ion-beam current or energy ranges (FF 2). The germane inquiry then, is whether the prior art collectively teaches or suggests employing permanent magnets in *any* ribbon beam ion implantation system that includes an ion source generating multiple ion species and an extraction system, as claimed.

In addition to the inventive, adjustable-focus implantation system, Benveniste also discloses prior-art implantation systems that do not have adjustable-focus magnets (FF 3). Regarding such prior-art implantation systems, Benveniste discloses:

A ‘correct’ quadrapole magnetic field strength depends in part, on . . . parameters such as beam current, energy, mass, as well as beamline parameters such as residual gas composition and pressure. Existing high current implanters must operate with a wide range of parameters, ideally requiring different amounts of focussing [sic] for optimal transmission of the ion beam and optimal mass selectivity.

Current sector magnets found in ion implanters are designed with fixed quadrapole focussing [sic] strength, selected for best operation with a nominal set of beam parameters. Outside these nominal conditions, particularly at very low energy (less than 10 k volts) and high currents, the performance of these systems is significantly compromised.

(FF 4). Restated, Benveniste discloses that (1) some prior-art implantation systems use magnets of fixed strengths; (2) these fixed-magnetic-strength implantation systems operate “best” within certain parameters; and (3) within other operating parameters, the fixed-magnetic-strength implantation systems are operable to varying degrees, albeit at less than maximal operation. *See Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 296 (Fed. Cir. 1985) (noting that a reference must be considered for all it teaches).

Benveniste is silent as to what types of magnets are used in these prior-art, fixed-magnetic-strength ion implantation systems. That is, Benveniste does not disclose whether permanent magnets or non-adjustable electromagnets are employed (FF 5). As noted by the Examiner though, Davis teaches that either permanent magnets or electromagnets may be used for mass analyzers (FF 6). Moreover, we agree with the Examiner that Vahrenkamp provides motivation for the skilled artisan to specifically

choose permanent magnets in lieu of electromagnets within a fixed-magnetic-strength mass analyzer: Vahrenkamp discloses that permanent magnets have an advantage over electromagnets with respect to the implantation system's cost and complexity (FF 7).

In limiting the arguments to adjustable-focus implantation systems, Appellant does not specifically dispute that permanent magnets may be employed in at least fixed-magnetic-strength ion implantation systems. The closest Appellant comes to this is in arguing that Davis teaches away from using permanent magnets because Davis discloses a preference for non-permanent magnets (Reply Br. 2). This argument is not persuasive.

Contrary to Appellant's assertion, Davis does not state or imply that mass analyzers cannot be constructed with permanent magnets (FF 8). Rather, Davis expressly states that while electromagnets might be more preferable, permanent magnets may also be used (FF 9). Preferred embodiments and disclosed examples do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989); *In re Mills*, 470 F.2d 649, 651 (CCPA 1972). Similarly, a statement that a first product is somewhat inferior to another product for the same use does not teach away when the reference also discloses that the first offers acceptable advantages. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). Moreover, as Vahrenkamp discloses advantages of permanent magnets relative to electromagnets (FF 7), Vahrenkamp further refutes Appellant's assertion that Davis teaches away from using permanent magnets.

For the foregoing reasons, Appellant has not persuaded us of error in the Examiner's obviousness rejection of representative claim 1.

Accordingly, we will sustain the Examiner's rejection of that claim and also claims 2, 4-17 and 21-29 which fall with claim 1.

Claim 3 depends from claim 1, and stands rejected under 35 U.S.C. § 103(a) as being obvious over Benveniste in view of Davis, Vahrenkamp, and Horsky. Appellant fails to present separate arguments for patentability of claim 3. Accordingly, we will also sustain the Examiner's rejection of claim 3.

#### CONCLUSIONS OF LAW

Appellant has not shown that the Examiner erred in finding that the cited prior art collectively teaches or suggests employing permanent magnets within at least some types of mass analyzers that were used in ribbon beam ion implantation systems.

Appellant has not shown that the Examiner erred in rejecting claims 1, 2, 4-17 and 21-29 under § 103(a) as unpatentable over Benveniste in view of Davis and Vahrenkamp.

Appellant has not shown that the Examiner erred in rejecting claim 3 under § 103(a) as unpatentable over Benveniste in view of Davis, Vahrenkamp and Horsky.

DECISION

We sustain the Examiner's rejections with respect to all pending claims on appeal. Therefore, the Examiner's rejections of claims 1-17 and 21-29 are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

babc

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